## Remarks/Arguments:

Claims 1-3 and 6-20 are pending in the case. The applicant appreciates the courtesies extended to Applicant's counsel during an interview at the Patent Office on October 8, 2003 by Examiners Courson and Gutierrez. As a result of that interview, the amended claims and remarks hereinbelow are respectfully submitted.

### Applicant's Invention

Applicant's invention is directed to a portable, handheld 3D angle measurement instrument that can be used in measuring angular displacement about any plane axis by simple manual movement of the device. As a handheld device, the present invention must be both lightweight and compact. To achieve such a lightweight and compact construction, the handheld casing of the device houses a microelectromachined (MEM) gyroscope, a microprocessor, and a battery. Unlike the conventional gyroscopes presently known in the art, the MEM gyroscope fits on a single chip, complete with all of the required electronics. In one embodiment, the dimensions of the MEM chip are only about 7 mm x 7 mm x 3mm.

The MEM gyroscope is capable of measuring angular acceleration/deceleration velocity and generating a voltage proportional to a corresponding angular inertia velocity. The microprocessor of the device then calculates and displays an angular displacement value using the output signal and a predetermined time factor.

### The Prior Art is Different

Kayama et al. (JP 01147314A) discloses an angle measuring device, such as might be represented by a protractor. The Kayama et al. device incorporates, and is based upon, a fiber optic gyro system. Shown specifically in Figure 2 of Kayama et al., the fiber optic gyro, or fiber ring, comprises a fiber coil section (element 5) which is key to operation of the device. As is well known in the art, fiber optic gyroscopes comprise two counterpropogating light beams which travel in a closed optical coil. The light beams exhibit a time difference that is proportional to the degree of rotation of the coil. The time difference is then reflected in a phase difference between the optical waves, which can be measured using the interferometer principle. Because this gyroscope requires a closed optical loop through which light must travel a

significant distance, the devices in which it is incorporated are much larger and significantly more expensive.

Albrecht et al. (U.S. Patent No. 6,354,011) discloses an orientation measuring device for determining the spatial orientation of rolls, bars, cylinders, etc. This device requires a cubic-shaped housing for holding either three laseroptical gyroscopes of very high precision, or alternatively, two clinometers and one laseroptical gyroscope. This, of necessity, requires a more massive, more complex, and more expensive construction. Further, it is not intended for portable, manual manipulation. Again, also, Albrecht et al. does not employ or suggest a MEM.

**The Examiner's Rejections Under 35 U.S.C. 102(b) Should Be Withdrawn**

Both the Patent Office and the CAFC (formerly the CCPA) have historically required that a single reference teach each and every element of the claim. That requirement is clear and unequivocal. Atlas Powder v. I.E. DuPont, 750 F.2d 1569, 224 USPQ 409 (CAFC 1984). James Bury Corp. v. Litton Industrial Products, 750 F.2d 1556, 225 USPQ 253 (CAFC 1985).

1. Claims 1-3, 5, and 10-11 stand rejected under 35 U.S.C. 102(b) as being anticipated by Kayama et al. (JP 01147314 A).

While Kayama et al. discloses an angle measuring instrument that incorporates a gyroscope, the gyroscope is a fiber optical type gyroscope. As amended, Claims 1 and 10 require that Applicant's portable, handheld device comprise a microelectromachined (MEM) gyroscope, which is substantially different from a fiber optical gyroscope (FOG). Lacking this element, and as discussed with the Examiners, Kayama et al. cannot properly form the basis for a rejection under 35 U.S.C. 102(b).

2. Claims 1, 3, and 8 stand rejected under 35 U.S.C. 102(b) as being anticipated by Albrecht (U.S. Patent No. 6,354,011 B1).

Albrecht discloses an orientation measuring device that houses either three laseroptical gyroscopes, or a combination of two clinometers and one laseroptical gyroscope. Thus, Albrecht also lacks a device comprising a microelectromachined gyroscope. Again, lacking this element, and as discussed with the Examiners, Albrecht cannot properly form the basis for a rejection under 35 U.S.C. 102(b).

**The Examiner's Rejections Under 35 U.S.C. 103(a) Should Be Withdrawn**

The CAFC (and the CCPA before it) have repeatedly held that, absent a teaching or suggestion in the primary reference for the need, arbitrary modifying of a primary reference or combining of references is improper. The ACS Hospital Systems, Inc. v. Montefiore Hospital, 732 F.2d 1572, 1577. 221 USPQ 929, 933 (Fed. Cir. 1984). In re Gieger, 815 F.2d 686, 688, 2 USPQ2d 1276, 1278 (Fed. Cir. 1987).

1. Claims 12-20 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Kayama et al., in view of Moeller et al. (U.S. Patent No. 5,331,404), Thomas et al. (U.S. Patent No. 5,150,104), Albrecht, and Prior Art (Applicant's Specification).

With respect to Claims 1-20, amended Claim 10 requires that the gyroscope be a microelectromachined (MEM) gyroscope, wherein the 3D angle measurement instrument comprises a handheld casing. Kayama et al., as previously discussed, requires a fiber optic gyroscope that must be constructed and configured with the space-consuming installation of a fiber optic coil section and the associated electronics; i.e., the design of the casing or housing for this type of gyroscope must provide for a "race track" array for the fiber optic coil section, with all other electronic components arranged therearound. Not only is the physical structure and required housing for the fiber optic gyroscope substantially different, but it functions in a substantially different manner. As also described above, the fiber optic gyroscope is constructed and operated with counterpropogating light beams such that a differentiation is made between the travel of each light beam proportional to the degree of rotation of the closed optical coil section. Although Kayama et al. teaches the use of fiber optic device, such an installation is actually neither practical (from the standpoint of size) nor cost effective. Fiber optic gyroscopes of the type used by Kayama et al. cost between about $1,500 and $2,000 each.

There is no teaching, suggestion, or motivation to modify Kayama et al. with a MEM gyroscope. Indeed, Kayama would have to be completely redesigned for a MEM gyroscope, which would amount to an improper combination of references. Further, a fiber optic gyroscope (FOG) and a MEM are both structurally and functionally different in significant ways. In a MEM, two sensing structures are provided that each contain a dither frame which is

electrostatically driven to resonance. A rotation about the Z-axis, normal to the plane of the chip (gyroscope), produces a Coriolis force which displaces the sensing structures perpendicular to the vibratory motion. This Coriolis motion is detected by a series of capacitive pickoff structures on the edge of the sensing structures. The resulting signal is amplified and demodulated to produce the rate signal output. Both the structure and functionality of the MEM, therefore, dictate a different installation and housing configuration as well as a substantially different electronic configuration and interface/communication with the microprocessor. For example, the MEM gyroscope's angular velocity output measure must be filtered and calculated in order to output the angular displacement which is required for a three-dimensional measuring instrument. This differs significantly from the angular displacement measure output of a fiber optic gyroscope.

In addition to comprising a significantly smaller and compact structure, the MEM gyroscope has a cost of only between about $10 and $70 per unit. The inventors have, thus, also developed a handheld device which is affordable for such a handheld application.

2. Claims 4, 6, 7, and 9 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Albrecht, in view of Nakamura (U.S. Patent No. 5,375,336), Moeller et al., Thomas et al., and Prior Art (Applicant's Specification).

The Examiner proposes to modify the bulky, cubic orientation measuring device of Albrecht et al. with the piezoelectric gyroscope configuration of Nakamura. First, and as discussed above, Albrecht's unique and complex construction comprises either three laseroptical gyroscopes mounted in a cubic housing, or one laseroptical gyroscope in combination with two clinometers. Albrecht's device is intended for measurements involving stationary objects. Nakamura, on the other hand, discloses a piezoelectric device that is used for detecting the position of a moving automobile. Other than the term "gyro" or "gyroscope", similarities between the inventions, their constructions, and functions, ends. Again, the structure and function of Albrecht's device would have to be completely redesigned; i.e., re-invented, and the Examiner has not suggested how or why that would be done. Also, again, although gyroscopes of various types perform a similar general function, they are substantially different in construction and functionality.

The applicant believes that the Examiner's rejections have been successfully overcome, and the application has been placed in condition for immediate allowance. Such action is respectfully requested. However, if any issue remains unresolved, Applicant's attorney would welcome the opportunity for a telephone interview to expedite allowance and issue.

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